

JAPANESE [JP,08-251178,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF
DRAWINGS DRAWINGS

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] In the information transfer approach which makes only the packet of an identification number which gives an identification number to a packet, transmits to it, and identifies and wishes the identification number of a packet ability ready for receiving a transmitting side The information to send is decomposed into the data for restoring the information on original from the high main information and main information on importance, and an identification number which is different in each is given, and it transmits. A receiving side It responds to the throughput of the equipment of a receiving side, and/or a network load. The information transfer approach characterized by directing to reduce the number of the packets which restrict the class of identification number of the packet which reduces the number of the packets which restrict the class of identification number of the packet which receives and receive, or transmits to a transmitting side, and transmit.

[Claim 2] said information transfer approach according to claim 1 -- setting -- the main information on a pixel, and difference -- instead of using information -- main information -- wireframe information -- carrying out -- difference -- the information transfer approach characterized by making information into the surface information on the field surrounded by the wireframe.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the information transfer approach which transmits an image, voice, and various data to real time through a network, such as data collection in a television conference or works, and an image transfer in a long distance.

[0002]

[Description of the Prior Art] When transmitting to the terminal which left information through the network, efforts of transmitting information correctly, or correcting or canceling the error generated in the bit error etc. have been performed. For example, if it says by the transport layer, in the transmission control protocol's (TCP's) including the resending procedure for transmitting information correctly and using a user datagram protocol (UDP), when a packet discards, it is coping with dropping per frame etc.

[0003] However, in an image transfer in TV meeting, by the conventional approach, an image stops for resending of a packet, or frame omission is carried out by abandonment of a packet, an image stops too, and real time nature may be spoiled. Thus, as a cause that resending and abandonment of a packet are performed, the throughput of the terminal of a receiving side being low, the case where there is too much transmitted information and congestion has arisen, etc. are raised.

[0004] As an approach of solving such a problem, picture compression is raised, that it is hard to start congestion, it carries out, or the process which was carrying out software processing is made hard, and reducing the part in which the throughput of an accepting station was reduced is performed. These things are the same also in a transfer [real time / data / not only an image but voice, or].

[0005]

[Problem(s) to be Solved by the Invention] When an ATM cell was used for an informational transfer, the informational component was divided with the priority, high priority information was transmitted in the high priority cell, and the attempt which transmits low priority information in a low priority cell was made. In this case, when a network carries out congestion, a low priority cell will be discarded by the congestion part, and real time nature will be maintained by transmitting only a high priority cell to the terminal of the destination. However, since the amount of information sent from a transmitting side does not change, real time nature may be spoiled as a result, without the ability receiving the cell which the condition of congestion is not solved, and arrives superfluously when the throughput of an accepting station is low. Moreover, delay will newly be produced by rearrangement of a cell which a high priority cell may reach earlier than a low priority cell, and reached depending on the network.

[0006] When it minds a network, there is also a method of performing a flow control between terminals. Drawing 2 is a block diagram with which the conventional information transfer approach equipped with the flow control operates, and the network where a transmit terminal and 2-2 connect an accepting station, and, as for 2-3, 2-1 connects 2-1 and 2-2, the virtual channel (VC) to which 2-4 transmits information, the traffic measurement section which detects the traffic volume of the information which 2-5 received, and 2-6 are control signals which direct

a halt of informational transmission.

[0007] In drawing 2, when the traffic measurement section 2-5 detects the congestion produced on the network 2-3 at the terminal 2-2 of a receiving side, it is the approach of sending directions so that the amount of information transmitted to a transmitting side 2-1 may be controlled. However, delay arises, or informational partial abandonment arises, and this approach is insufficient for real time information transfer, in order to only restrict the amount of information transmitted by the transmitting side. Moreover, when there are two or more accepting stations to one transmit terminal, there is a fault that the amount of information transmitted to all accepting stations will be restricted according to the condition of the network to one accepting station.

[0008] That is, real time nature has transmitted all information to a network regardless of informational importance with a conventional means to transmit required information with one identification number, in order. A network load is low enough, and when the accepting station has sufficient throughput, the high information transfer of real time nature is possible. When the throughput of the case where a network load is expensive, or an accepting station was declining, the information which was not able to be received was discarded and resending of data which could not receive to the transmit terminal was demanded. Therefore, a network load can be expensive, or when the throughput of an accepting station is declining, the time delay by data resending can occur, or high information on importance is also discarded with the low information on importance, and real time nature cannot be maintained. Moreover, when it has two or more accepting stations to one master station, the real time nature to other accepting stations will also be barred for resending of one terminal.

[0009] The capacity of an accepting station declines, or when congestion arises to a network and you need real time information transfer, in order to solve the congestion of the capacity fall of an accepting station, or a network by the conventional approach, delay arises, or main information is discarded, and this invention aims at solving the point that real time nature was lost.

[0010]

[Means for Solving the Problem] This invention is characterized [main] by providing an accepting station with real time always information transfer, without making the application of a transmitting side conscious of a network congestion condition or the throughput of an accepting station.

[0011] Drawing 1 is a block diagram with which this invention approach operates. A transmit terminal and 1-2 1-1 An accepting station, The network where 1-3 connects 1-1 and 1-2, the virtual channel to which 1-4 transmits main information (VC), 1-5 -- difference -- the traffic measurement section which detects the traffic volume of the virtual channel (VC) which transmits information, and the information which 1-6 received, and the loaded condition of an accepting station, and 1-7 -- difference -- it is the control signal which directs a halt of informational transmission and reception. It divides into information. the information transmitted in drawing 1 -- the difference of main information and its remainder -- It puts and transmits to the packet which has an identification number which is different although it is the respectively same priority. Limit the class of identification number of the packet which receives according to a current throughput by the measurement result of the traffic measurement section 1-6 in an accepting station 1-2, and amount of information is controlled. the need -- responding -- difference -- information, when it is created by the complement from main information and the network is carrying out congestion a transmit terminal 1-1 -- receiving -- difference -- by sending directions so that informational transmission may be suspended, the amount of information to a network is controlled and real time always information transfer is made possible.

[0012] Drawing 3 is a block diagram in the case of having two or more accepting stations to one transmit terminal, and the accepting station of plurality [1 / 3- / 2 / transmit-terminal and / 3-] and 3-3 are networks which connect the terminal of 3-2 with 3-1.

[0013]

[Function] this invention -- like -- information -- the difference of main information and its

remainder -- time a network load is expensive with a means to put and transmit to the packet which has a different identification number although it divides into information and is the respectively same priority -- a transmit terminal -- receiving -- difference -- the case where directed to stop information and the throughput of an accepting station declines -- difference -- he is trying not to receive information therefore -- the case where a network load becomes high -- difference -- the case where became possible to lower a network load by stopping information, and the throughput of an accepting station declines -- difference -- it becomes possible by not receiving information to improve a throughput. the terminal with which the throughput declined also when it had two or more accepting stations to one master station, as shown in drawing 3 -- difference -- it becomes possible by refusing informational reception to affect and carry out effect of the accepting station on others. This can perform now real time always information transfer which is the purpose of this invention.

[0014]

[Example]

(Example 1) Drawing 4 is drawing explaining the example of this invention.

[0015] Drawing 4 is the block diagram of the 1st example. A transmit terminal and 4-2 4-1 An accepting station, The network where 4-3 connects 4-1 and 4-2, the virtual channel to which 4-4 transmits main information (VC), 4-5 -- difference -- the virtual channel (VC) which transmits information (high priority), and 4-6 -- difference -- the virtual channel (VC) which transmits information (low priority) -- A function 4-7 -- difference -- the function which stops informational transmission, and 4-8 -- difference -- informational reception is refused -- the traffic measurement section which detects the traffic volume of the information which 4-9 received, and the loaded condition of an accepting station, and 4-10 -- difference -- the control signal which directs a halt of informational transmission and reception, and 4-11 are the image complement generation sections which complement and generate an image.

[0016] virtual channel (VC) 4-4 which send main information between a transmit terminal 4-1 and an accepting station 4-2, one, or two or more difference -- the virtual channel 4-5 which sends information, and 4-6 are installed. moreover -- a transmit terminal -- difference -- the function 4-7 which stops informational transmission -- an accepting station -- difference -- there is a function 4-8 to refuse informational reception. There is the traffic measurement section 4-9 in an accepting station, and the control signal 4-10 which controls a function 4-7 and 4-8 from this traffic measurement section 4-9 is transmitted. Furthermore, there is the image complement generation section 4-11 in an accepting station.

[0017] Next, actuation is explained. the unit block whose 5-1 drawing 5 is an image which a transmit terminal transmits in the 1st example, and constitutes the pixel of an image, and 5-2 -- the main information on an image, and 5-3 -- difference -- information (high priority) and 5-4 -- difference -- information (low priority), the packet which 5-5 transmits to a network, and 5-6 are the virtual channel identifiers (VCI) attached in the packet. a pixel -- the block 5-1 beside [2] vertical 2x -- dividing -- respectively -- the inside of each block -- an upper left point -- the point of the main information 5-2 and the lower right -- difference -- the point of information (high priority) 5-3 and others -- difference -- it considers as information (low priority) 5-4. such main information and difference -- information (high priority) and difference -- information (low priority) summarizes the thing of the same contents of information, and turns packet 5-5, and the identifier (VCI) 5-6 of a virtual channel which is different for each information is attached. All of these packets transmit on a network as the same priority.

[0018] In an accepting station, a network condition and the loaded condition of an accepting station are supervised in the traffic measurement section 4-9 shown in drawing 4. the case where it is checked that a network load is expensive and the traffic measurement section 4-9 has not received the main information from a network completely -- a control signal 4-10 -- using -- a transmit terminal -- difference -- it directs to stop informational (low priority) transmission.

[0019] Drawing 6 expresses the condition at this time. this difference -- the condition that informational (low priority) transmission was stopped is called a condition 1, and an initial state is called a condition 0. the case where it is checked in this condition 1 that the network load has

not received the main information from a network completely highly still more -- a control signal 4-10 -- using -- a transmit terminal -- difference -- it directs to stop informational (high priority) transmission.

[0020] Drawing 7 expresses this condition. The transition diagram of a condition is shown in drawing 8. When reduction of the load of a fixed time amount network is checked in a condition 2, it changes in the condition 1. Moreover, when reduction of the load of a fixed time amount network is checked in a condition 1, it changes in the condition 0.

[0021] the case where it is checked that, as for the traffic measurement section 4-9, the throughput of an accepting station cannot process completely the main information fallen and received -- a control signal 4-10 -- using -- an accepting station -- difference -- it directs to refuse informational (low priority) reception. Drawing 9 expresses this condition. this -- difference -- information (low priority) -- reception -- refusing -- having had -- a condition -- a condition -- one -- ' -- an initial state -- a condition -- zero -- ' -- calling -- this -- a condition -- one -- ' -- setting -- still more -- an accepting station -- a throughput -- low -- a network -- from -- main -- information -- perfect -- it can process -- **** -- things -- checking -- having had -- a case -- a control signal 4-10 -- using -- an accepting station -- difference -- it directs to refuse informational (high priority) reception. Drawing 10 expresses this condition.

[0022] The transition diagram of a condition is shown in drawing 11. When recovery of the throughput of a fixed time amount accepting station is checked in condition 2', it changes to condition 1'. Moreover, when recovery of the throughput of a fixed time amount accepting station is checked in condition 1', it changes to condition 0'.

[0023] drawing 4 -- setting -- the image complement generation section 4-11 -- the main information on an image or main information, and difference -- the difference from information (high priority) -- information (high priority) and difference -- informational (low priority) image data is generated.

[0024] difference -- the condition 1 that information (low priority) is not received, or condition 1' -- each block unit of a pixel -- the main information on an image, and difference -- informational (high priority) data -- reproducing -- difference -- informational (low priority) data are generated. drawing 12 expresses this condition and an upper right point is copied from main information within each block -- having -- moreover, a lower left point -- difference -- it is copied from information (high priority).

[0025] difference -- information (low priority) and difference -- the condition 2 that information (high priority) is not received, or condition 2' -- each block unit of a pixel -- the data of the main information on an image -- reproducing -- difference -- information (low priority) and difference -- informational (high priority) data are generated. Drawing 13 expresses this condition and three in each block are copied from main information.

[0026] the case where a network load is expensive and main information cannot fully transmit as a result of performing the above actuation -- difference, by stopping informational transmission, a network load is lowered and a transfer of main information is attained. moreover -- the case where the throughput of an accepting station declined and it becomes impossible to process main information enough -- difference -- informational reception is made to recover a stop throughput and processing of main information is enabled. Moreover, in an accepting station, although complement generation of the image is carried out automatically and a pixel becomes coarse according to the class of information received, the continuous display of an image is enabled. Moreover, with actuation of the application of a transmit terminal and an accepting station, these actuation does not increase the load of application in order to operate independently.

[0027] It is not concerned with the condition of a network load or the throughput of an accepting station in the system which transmits an image on a network, but a transfer [real time / information / on an image / main] is attained, and a pixel comes to be able to perform the continuous display without the stress of a certain thing as the effectiveness, when becoming coarse.

[0028] (Example 2) Drawing 14 shows the example which applied this invention to the image data

transfer of a three dimension. the difference which the main information which a transmit terminal becomes in the sign 14-1 in drawing, and an accepting station and 14-3 become from wireframe information in 14-2, and 14-4 become from surface information -- information (high priority) and the difference which 14-5 becomes from surface information -- information (low priority) and 14-6 express the former image of a three dimension.

[0029] The former image 14-6 of a three dimension is divided into the surface information of the image or material stuck on the field inserted into real time by migration and/or the data about the wireframe of a solid figure which rotates and/or deforms, and its wireframe, and is transmitted using a virtual channel identifier (VCI) different, respectively.

[0030] wireframe information -- as the main information 14-3 -- surface information -- difference -- it is transmitted as information. the case where the information from which lack poses a problem also for surface information is included -- it -- difference -- information (high priority) 14-4 -- carrying out -- others -- difference -- it considers as information (low priority) 14-5, and is transmitted by the separate virtual channel identifier (VCI).

[0031] Actuation by the side of an accepting station 14-2 is performed in the form corresponding to drawing 4 , drawing 6 , drawing 7 , drawing 8 , drawing 9 , drawing 10 , and drawing 11 . By the result, the condition (a condition 1 or 1') that all the information 14-3, 14-4, and 14-5 are received, the condition (a condition 2 or 2') that information 14-5 does not exist, and the condition (a condition 3 or 3') that only information 14-3 exists occur.

[0032]

[Effect of the Invention] the case where the network load went up, and congestion arose, or the throughput of an accepting station declined, and it becomes impossible to process no information according to this invention as explained above -- difference, by stopping informational transmission or reception, a network load is lowered, or the throughput of an accepting station is secured, and the real time transfer without delay and abandonment of main information is attained. Consequently, in any situations, real time always information transfer is made possible.

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TECHNICAL FIELD

[Industrial Application] This invention relates to the information transfer approach which transmits an image, voice, and various data to real time through a network, such as data collection in a television conference or works, and an image transfer in a long distance.

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PRIOR ART

[Description of the Prior Art] When transmitting to the terminal which left information through the network, efforts of transmitting information correctly, or correcting or canceling the error generated in the bit error etc. have been performed. For example, if it says by the transport layer, in the transmission control protocol's (TCP's) including the resending procedure for transmitting information correctly and using a user datagram protocol (UDP), when a packet discards, it is coping with dropping per frame etc.

[0003] However, in an image transfer in TV meeting, by the conventional approach, an image stops for resending of a packet, or frame omission is carried out by abandonment of a packet, an image stops too, and real time nature may be spoiled. Thus, as a cause that resending and abandonment of a packet are performed, the throughput of the terminal of a receiving side being low, the case where there is too much transmitted information and congestion has arisen, etc. are raised.

[0004] As an approach of solving such a problem, picture compression is raised, that it is hard to start congestion, it carries out, or the process which was carrying out software processing is made hard, and reducing the part in which the throughput of an accepting station was reduced is performed. These things are the same also in a transfer [real time / data / not only an image but voice, or].

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EFFECT OF THE INVENTION

[Effect of the Invention] the case where the network load went up, and congestion arose, or the throughput of an accepting station declined, and it becomes impossible to process no information according to this invention as explained above — difference, by stopping informational transmission or reception, a network load is lowered, or the throughput of an accepting station is secured, and the real time transfer without delay and abandonment of main information is attained. Consequently, in any situations, real time always information transfer is made possible.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] When an ATM cell was used for an informational transfer, the informational component was divided with the priority, high priority information was transmitted in the high priority cell, and the attempt which transmits low priority information in a low priority cell was made. In this case, when a network carries out congestion, a low priority cell will be discarded by the congestion part, and real time nature will be maintained by transmitting only a high priority cell to the terminal of the destination. However, since the amount of information sent from a transmitting side does not change, real time nature may be spoiled as a result, without the ability receiving the cell which the condition of congestion is not solved, and arrives superfluously when the throughput of an accepting station is low. Moreover, delay will newly be produced by rearrangement of a cell which a high priority cell may reach earlier than a low priority cell, and reached depending on the network.

[0006] When it minds a network, there is also a method of performing a flow control between terminals. Drawing 2 is a block diagram with which the conventional information transfer approach equipped with the flow control operates, and the network where a transmit terminal and 2-2 connect an accepting station, and, as for 2-3, 2-1 connects 2-1 and 2-2, the virtual channel (VC) to which 2-4 transmits information, the traffic measurement section which detects the traffic volume of the information which 2-5 received, and 2-6 are control signals which direct a halt of informational transmission.

[0007] In drawing 2, when the traffic measurement section 2-5 detects the congestion produced on the network 2-3 at the terminal 2-2 of a receiving side, it is the approach of sending directions so that the amount of information transmitted to a transmitting side 2-1 may be controlled. However, delay arises, or informational partial abandonment arises, and this approach is insufficient for real time information transfer, in order to only restrict the amount of information transmitted by the transmitting side. Moreover, when there are two or more accepting stations to one transmit terminal, there is a fault that the amount of information transmitted to all accepting stations will be restricted according to the condition of the network to one accepting station.

[0008] That is, real time nature has transmitted all information to a network regardless of informational importance with a conventional means to transmit required information with one identification number, in order. A network load is low enough, and when the accepting station has sufficient throughput, the high information transfer of real time nature is possible. When the throughput of the case where a network load is expensive, or an accepting station was declining, the information which was not able to be received was discarded and resending of data which could not receive to the transmit terminal was demanded. Therefore, a network load can be expensive, or when the throughput of an accepting station is declining, the time delay by data resending can occur, or high information on importance is also discarded with the low information on importance, and real time nature cannot be maintained. Moreover, when it has two or more accepting stations to one master station, the real time nature to other accepting stations will also be barred for resending of one terminal.

[0009] The capacity of an accepting station declines, or when congestion arises to a network and you need real time information transfer, in order to solve the congestion of the capacity fall

of an accepting station, or a network by the conventional approach, delay arises, or main information is discarded, and this invention aims at solving the point that real time nature was lost.

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MEANS

[Means for Solving the Problem] This invention is characterized [main] by providing an accepting station with real time always information transfer, without making the application of a transmitting side conscious of a network congestion condition or the throughput of an accepting station.

[0011] Drawing 1 is a block diagram with which this invention approach operates. A transmit terminal and 1-2 1-1 An accepting station, The network where 1-3 connects 1-1 and 1-2, the virtual channel to which 1-4 transmits main information (VC), 1-5 -- difference -- the traffic measurement section which detects the traffic volume of the virtual channel (VC) which transmits information, and the information which 1-6 received, and the loaded condition of an accepting station, and 1-7 -- difference -- it is the control signal which directs a halt of informational transmission and reception. It divides into information. the information transmitted in drawing 1 -- the difference of main information and its remainder -- It puts and transmits to the packet which has an identification number which is different although it is the respectively same priority. Limit the class of identification number of the packet which receives according to a current throughput by the measurement result of the traffic measurement section 1-6 in an accepting station 1-2, and amount of information is controlled. the need -- responding -- difference -- information, when it is created by the complement from main information and the network is carrying out congestion a transmit terminal 1-1 -- receiving -- difference -- by sending directions so that informational transmission may be suspended, the amount of information to a network is controlled and real time always information transfer is made possible.

[0012] Drawing 3 is a block diagram in the case of having two or more accepting stations to one transmit terminal, and the accepting station of plurality [1 / 3- / 2 / transmit-terminal and / 3-] and 3-3 are networks which connect the terminal of 3-2 with 3-1.

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OPERATION

[Function] this invention -- like -- information -- the difference of main information and its remainder -- time a network load is expensive with a means to put and transmit to the packet which has a different identification number although it divides into information and is the respectively same priority -- a transmit terminal -- receiving -- difference -- the case where directed to stop information and the throughput of an accepting station declines -- difference -- he is trying not to receive information therefore -- the case where a network load becomes high -- difference -- the case where became possible to lower a network load by stopping information, and the throughput of an accepting station declines -- difference -- it becomes possible by not receiving information to improve a throughput. the terminal with which the throughput declined also when it had two or more accepting stations to one master station, as shown in drawing 3 -- difference -- it becomes possible by refusing informational reception to affect and carry out effect of the accepting station on others. This can perform now real time always information transfer which is the purpose of this invention.

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EXAMPLE

[Example]

(Example 1) Drawing 4 is drawing explaining the example of this invention.

[0015] Drawing 4 is the block diagram of the 1st example. A transmit terminal and 4-2 4-1 An accepting station, The network where 4-3 connects 4-1 and 4-2, the virtual channel to which 4-4 transmits main information (VC), 4-5 -- difference -- the virtual channel (VC) which transmits information (high priority), and 4-6 -- difference -- the virtual channel (VC) which transmits information (low priority) -- A function 4-7 -- difference -- the function which stops informational transmission, and 4-8 -- difference -- informational reception is refused -- the traffic measurement section which detects the traffic volume of the information which 4-9 received, and the loaded condition of an accepting station, and 4-10 -- difference -- the control signal which directs a halt of informational transmission and reception, and 4-11 are the image complement generation sections which complement and generate an image.

[0016] virtual channel (VC)4-4 which send main information between a transmit terminal 4-1 and an accepting station 4-2, one, or two or more difference -- the virtual channel 4-5 which sends information, and 4-6 are installed. moreover -- a transmit terminal -- difference -- the function 4-7 which stops informational transmission -- an accepting station -- difference -- there is a function 4-8 to refuse informational reception. There is the traffic measurement section 4-9 in an accepting station, and the control signal 4-10 which controls a function 4-7 and 4-8 from this traffic measurement section 4-9 is transmitted. Furthermore, there is the image complement generation section 4-11 in an accepting station.

[0017] Next, actuation is explained. the unit block whose 5-1 drawing 5 is an image which a transmit terminal transmits in the 1st example, and constitutes the pixel of an image, and 5-2 -- the main information on an image, and 5-3 -- difference -- information (high priority) and 5-4 -- difference -- information (low priority), the packet which 5-5 transmits to a network, and 5-6 are the virtual channel identifiers (VCI) attached in the packet. a pixel -- the block 5-1 beside [2] vertical 2x -- dividing -- respectively -- the inside of each block -- an upper left point -- the point of the main information 5-2 and the lower right -- difference -- the point of information (high priority) 5-3 and others -- difference -- it considers as information (low priority) 5-4. such main information and difference -- information (high priority) and difference -- information (low priority) summarizes the thing of the same contents of information, and turns packet 5-5, and the identifier (VCI) 5-6 of a virtual channel which is different for each information is attached. All of these packets transmit on a network as the same priority.

[0018] In an accepting station, a network condition and the loaded condition of an accepting station are supervised in the traffic measurement section 4-9 shown in drawing 4 . the case where it is checked that a network load is expensive and the traffic measurement section 4-9 has not received the main information from a network completely -- a control signal 4-10 -- using -- a transmit terminal -- difference -- it directs to stop informational (low priority) transmission.

[0019] Drawing 6 expresses the condition at this time. this difference -- the condition that informational (low priority) transmission was stopped is called a condition 1, and an initial state is called a condition 0. the case where it is checked in this condition 1 that the network load has

not received the main information from a network completely highly still more -- a control signal 4-10 -- using -- a transmit terminal -- difference -- it directs to stop informational (high priority) transmission.

[0020] Drawing 7 expresses this condition. The transition diagram of a condition is shown in drawing 8. When reduction of the load of a fixed time amount network is checked in a condition 2, it changes in the condition 1. Moreover, when reduction of the load of a fixed time amount network is checked in a condition 1, it changes in the condition 0.

[0021] the case where it is checked that, as for the traffic measurement section 4-9, the throughput of an accepting station cannot process completely the main information fallen and received -- a control signal 4-10 -- using -- an accepting station -- difference -- it directs to refuse informational (low priority) reception. Drawing 9 expresses this condition. this -- difference -- information (low priority) -- reception -- refusing -- having had -- a condition -- a condition -- one -- ' -- an initial state -- a condition -- zero -- ' -- calling -- this -- a condition -- one -- ' -- setting -- still more -- an accepting station -- a throughput -- low -- a network -- from -- main -- information -- perfect -- it can process -- **** -- things -- checking -- having had -- a case -- a control signal 4-10 -- using -- an accepting station -- difference -- it directs to refuse informational (high priority) reception. Drawing 10 expresses this condition.

[0022] The transition diagram of a condition is shown in drawing 11. When recovery of the throughput of a fixed time amount accepting station is checked in condition 2', it changes to condition 1'. Moreover, when recovery of the throughput of a fixed time amount accepting station is checked in condition 1', it changes to condition 0'.

[0023] drawing 4 -- setting -- the image complement generation section 4-11 -- the main information on an image or main information, and difference -- the difference from information (high priority) -- information (high priority) and difference -- informational (low priority) image data is generated.

[0024] difference -- the condition 1 that information (low priority) is not received, or condition 1' -- each block unit of a pixel -- the main information on an image, and difference -- informational (high priority) data -- reproducing -- difference -- informational (low priority) data are generated. drawing 12 expresses this condition and an upper right point is copied from main information within each block -- having -- moreover, a lower left point -- difference -- it is copied from information (high priority).

[0025] difference -- information (low priority) and difference -- the condition 2 that information (high priority) is not received, or condition 2' -- each block unit of a pixel -- the data of the main information on an image -- reproducing -- difference -- information (low priority) and difference -- informational (high priority) data are generated. Drawing 13 expresses this condition and three in each block are copied from main information.

[0026] the case where a network load is expensive and main information cannot fully transmit as a result of performing the above actuation -- difference, by stopping informational transmission, a network load is lowered and a transfer of main information is attained. moreover -- the case where the throughput of an accepting station declined and it becomes impossible to process main information enough -- difference -- informational reception is made to recover a stop throughput and processing of main information is enabled. Moreover, in an accepting station, although complement generation of the image is carried out automatically and a pixel becomes coarse according to the class of information received, the continuous display of an image is enabled. Moreover, with actuation of the application of a transmit terminal and an accepting station, these actuation does not increase the load of application in order to operate independently.

[0027] It is not concerned with the condition of a network load or the throughput of an accepting station in the system which transmits an image on a network, but a transfer [real time / information / on an image / main] is attained, and a pixel comes to be able to perform the continuous display without the stress of a certain thing as the effectiveness, when becoming coarse.

[0028] (Example 2) Drawing 14 shows the example which applied this invention to the image data

transfer of a three dimension. the difference which the main information which a transmit terminal becomes in the sign 14-1 in drawing, and an accepting station and 14-3 become from wireframe information in 14-2, and 14-4 become from surface information -- information (high priority) and the difference which 14-5 becomes from surface information -- information (low priority) and 14-6 express the former image of a three dimension.

[0029] The former image 14-6 of a three dimension is divided into the surface information of the image or material stuck on the field inserted into real time by migration and/or the data about the wireframe of a solid figure which rotates and/or deforms, and its wireframe, and is transmitted using a virtual channel identifier (VCI) different, respectively.

[0030] wireframe information -- as the main information 14-3 -- surface information -- difference -- it is transmitted as information. the case where the information from which lack poses a problem also for surface information is included -- it -- difference -- information (high priority) 14-4 -- carrying out -- others -- difference -- it considers as information (low priority) 14-5, and is transmitted by the separate virtual channel identifier (VCI).

[0031] Actuation by the side of an accepting station 14-2 is performed in the form corresponding to drawing 4 , drawing 6 , drawing 7 , drawing 8 , drawing 9 , drawing 10 , and drawing 11 . By the result, the condition (a condition 1 or 1') that all the information 14-3, 14-4, and 14-5 are received, the condition (a condition 2 or 2') that information 14-5 does not exist, and the condition (a condition 3 or 3') that only information 14-3 exists occur.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram with which this invention approach operates.

[Drawing 2] It is the block diagram with which the conventional information transfer approach equipped with the flow control operates.

[Drawing 3] It is a block diagram in the case of having two or more accepting stations to one transmit terminal.

[Drawing 4] It is the block diagram of the 1st example.

[Drawing 5] It is the image which a transmit terminal transmits in the 1st example.

[Drawing 6] It is the Fig. of the condition 1 when a network load becomes high in the 1st example of operation.

[Drawing 7] It is the Fig. of the condition 2 when a network load becomes high in the 1st example of operation.

[Drawing 8] It is a transition diagram in the condition of changing with a network load in the 1st example.

[Drawing 9] It is the Fig. of the condition 1 when the throughput of an accepting station declines in the 1st example of operation.

[Drawing 10] It is the Fig. of the condition 2 when the throughput of an accepting station declines in the 1st example of operation.

[Drawing 11] It is a transition diagram in the condition that the throughput of an accepting station changes by fall in the 1st example.

[Drawing 12] In the 1st example, it is pixel data which the image complement generation section generates in the condition 1.

[Drawing 13] In the 1st example, it is pixel data which the image complement generation section generates in the condition 2.

[Drawing 14] It is drawing showing the 2nd example.

[Description of Notations]

1-1 Transmit Terminal

1-2 Accepting Station

1-3 Network

1-4 Virtual Channel

1-5 Virtual Channel

1-6 Traffic Measurement Section

1-7 Control Signal

14-1 Transmit Terminal

14-2 Accepting Station

14-3 Main Information

14-4 Difference -- Information (High Priority)

14-5 Difference -- Information (Low Priority)

14-6 Former Image

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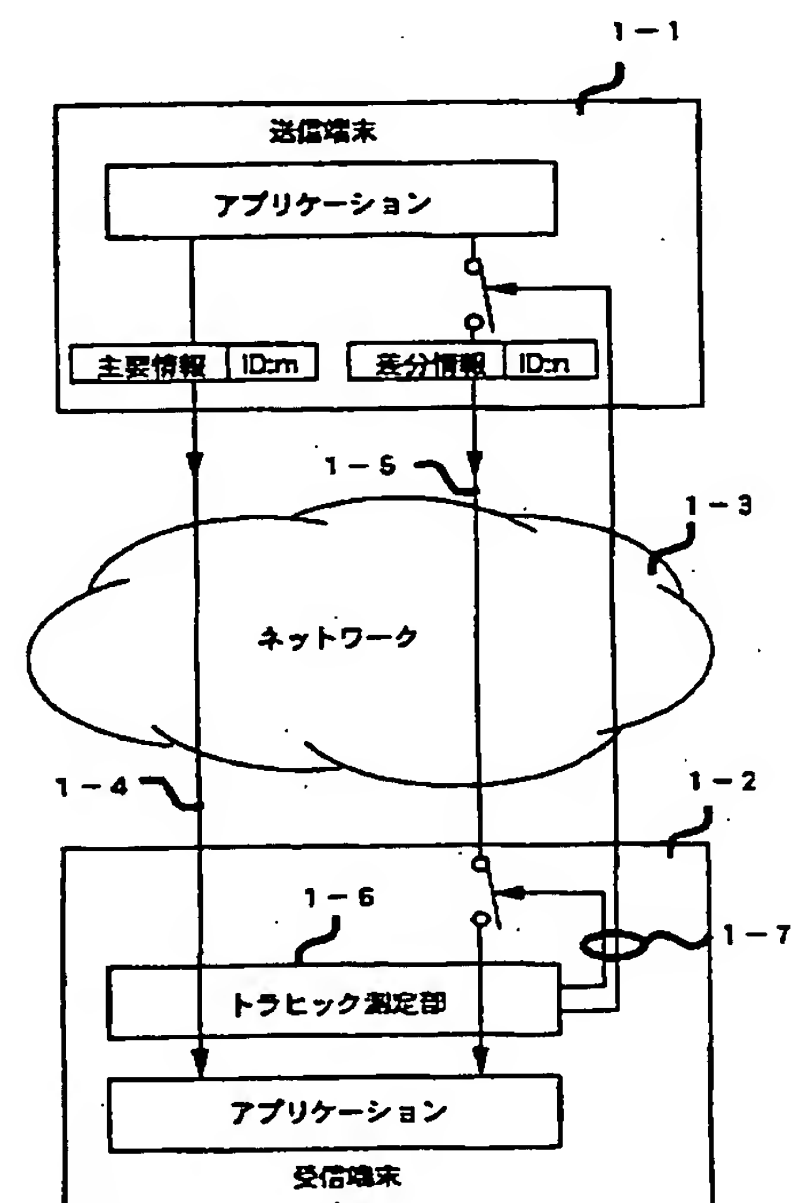
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(54) 【発明の名称】 情報転送方法

(57) 【要約】

【目的】 本発明は、受信端末の能力が低下したりネットワークに輻輳が生じた場合にもリアルタイム性が失われないようにすることを目的としている。

【構成】 送信する情報を主要情報と差分情報とに分割し、夫々同じ優先度であるが異なる識別番号を有するパケットに乗せて送信し、状況に応じて差分情報の受信を制限して主要情報から補完するようにする。



【特許請求の範囲】

【請求項1】 パケットに識別番号を付与して送信しパケットの識別番号を識別して希望する識別番号のパケットのみを受信可能とする情報転送方法において、送信側は、送る情報を、重要性の高い主要情報と主要情報から元の情報を復元するためのデータに分解し、それぞれを異なる識別番号を付与して送信し、受信側は、受信側の装置の処理能力および／またはネットワークの負荷に応じて、受信するパケットの識別番号の種類を制限して受信するパケットの数を減らすか、または送信側に対して送信するパケットの識別番号の種類を制限して送信するパケットの数を減らすように指示することを特徴とする情報転送方法。

【請求項2】 前記請求項1記載の情報転送方法において、画素の主要情報および差分情報を用いる代わりに、主要情報をワイヤフレーム情報とし、差分情報をワイヤフレームで囲まれた面の表面情報とすることを特徴とする情報転送方法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、テレビ会議や工場でのデータ収集、遠距離での画像転送等、ネットワークを介して画像、音声、各種データをリアルタイムに転送する情報転送方法に関するものである。

【0002】

【従来の技術】ネットワークを介して情報を離れた端末に転送する場合、情報を正確に転送する、あるいはビット誤り等で発生した誤りを訂正したり破棄したりする、といった努力が行われてきた。例えばトランスポート層で言えば、トランスミッション・コントロール・プロトコル(TCP)は情報を正確に転送するための再送手順を含んでおり、またユーザ・データグラム・プロトコル(UDP)を使う場合には、パケットが廃棄した場合にはフレーム単位で落とす等の対処を行っている。

【0003】しかし、TV会議での画像転送の場合、従来の方法では、パケットの再送のために映像が停止してしまったり、パケットの廃棄によってフレーム落ちし、やはり映像が停止してしまい、リアルタイム性が損なわれる場合がある。このようにパケットの再送や廃棄が行われる原因としては、受信側の端末の処理能力が低いことや、送信している情報が多すぎて輻輳が生じてしまった場合等があげられる。

【0004】このような問題を解決する方法として、画像圧縮を高め輻輳を起こしにくくしたり、ソフト処理していたプロセスをハード化し、受信端末の処理能力を低下させていた箇所を減らすことが行われている。これらのことは画像に限らず音声やデータのリアルタイムな転送においても同様である。

【0005】

【発明が解決しようとする課題】情報の転送にATMセ

ルを用いる場合、情報の成分を優先度で分け、高優先情報は高優先セルで送信し、低優先情報は低優先セルで送信する試みがなされた。この場合、ネットワークが輻輳した場合は輻輳箇所によって低優先セルが廃棄され、高優先セルのみが宛先の端末に送信されることによってリアルタイム性が維持されることになる。しかし、送信側から送られる情報量は変わらないため、輻輳の状態は解決されず、また受信端末の処理能力が低い場合には、過剰に到着するセルを受信しきれずに、結果としてリアルタイム性が損なわれることがある。またネットワークによっては、高優先セルが低優先セルよりも早く到着する場合があります、到着したセルの並び換えによって遅延が新たに生まれることになる。

【0006】ネットワークを介する場合、端末間でフロー制御を行う方法もある。図2はフロー制御を備えた従来の情報転送方法が動作する構成図であり、2-1は送信端末、2-2は受信端末、2-3は2-1と2-2とを接続するネットワーク、2-4は情報を転送する仮想チャネル(VC)、2-5は受信した情報のトラヒック量を検出するトラヒック測定部、2-6は情報の送信の停止を指示する制御信号である。

【0007】図2においては、ネットワーク2-3上で生じた輻輳をトラヒック測定部2-5によって受信側の端末2-2で検出すると、送信側2-1に対して送信する情報量を抑制するように指示を送る方法である。しかし、この方法では送信側で送信する情報量を制限するだけであるため、遅延が生じたり、情報の部分的な廃棄が生じ、リアルタイムな情報転送には不十分である。また、一つの送信端末に対し複数受信端末が有る場合、一つの受信端末までのネットワークの状態によって、全ての受信端末へ送信する情報量が制限されてしまうという欠点がある。

【0008】即ち、リアルタイム性が必要な情報を1つの識別番号で転送する従来の手段では、情報の重要性とは関係なく、全ての情報を順番にネットワークに対して送信している。ネットワークの負荷が十分低く、受信端末が十分な処理能力を有している場合にはリアルタイム性の高い情報転送が可能である。ネットワークの負荷が高い場合や受信端末の処理能力が低下している場合には、受信しきれなかった情報を廃棄したり、送信端末に対して受信し損ねたデータの再送を要求したりしていた。そのために、ネットワークの負荷が高かったり受信端末の処理能力が低下していた場合には、データ再送による遅延時間が発生したり、重要性の低い情報と共に重要性の高い情報も廃棄していたりしており、リアルタイム性を維持することはできない。また1つの発信端末に対し複数の受信端末を有する場合には、1つの端末の再送のために、他の受信端末に対するリアルタイム性も妨げてしまうことになる。

【0009】本発明は、受信端末の能力が低下したりネ

ットワークに輻輳が生じた場合においてもリアルタイムな情報転送を必要とする場合において、従来の方法では受信端末の能力低下やネットワークの輻輳を解決するために遅延が生じたり、主要情報が廃棄されたりしてリアルタイム性が失われていた点を解決することを目的としている。

【0010】

【課題を解決するための手段】本発明は送信側のアプリケーションにネットワークの輻輳状態や受信端末の処理能力を意識させることなく、受信端末に常にリアルタイムな情報転送を提供することを最も主要な特徴とする。

【0011】図1は本発明方法が動作する構成図であり、1-1は送信端末、1-2は受信端末、1-3は1-1と1-2とを接続するネットワーク、1-4は主要情報を転送する仮想チャネル(VC)、1-5は差分情報を転送する仮想チャネル(VC)、1-6は受信した情報のトラヒック量および受信端末の負荷状態を検出するトラヒック測定部、1-7は差分情報の送信および受信の停止を指示する制御信号である。図1においては、送信する情報を主要情報とその残りとの差分情報に分割し、それぞれ同じ優先度であるが異なる識別番号を有するパケットに乗せて送信し、受信端末1-2ではトラヒック測定部1-6の測定結果によって現在の処理能力に応じて受信するパケットの識別番号の種類を限定し情報量を抑制し、必要に応じて差分情報は主要情報からの補完によって作成され、また、ネットワークが輻輳している場合には、送信端末1-1に対して差分情報の送信を停止するように指示を送ることによって、ネットワークへの情報量の抑制を行い、常にリアルタイムな情報転送を可能としている。

【0012】図3は一つの送信端末に対し複数の受信端末を持つ場合の構成図であり、3-1は送信端末、3-2は複数の受信端末、3-3は3-1と3-2の端末を接続するネットワークである。

【0013】

【作用】本発明のように、情報を主要情報とその残りとの差分情報に分割し、それぞれ同じ優先度であるが異なる識別番号を有するパケットに乗せて送信する手段では、ネットワークの負荷が高いときには送信端末に対して差分情報を停止するように指示し、受信端末の処理能力が低下した場合には差分情報を受信しないようにしている。そのため、ネットワークの負荷が高くなった場合には差分情報を停止することによって、ネットワークの負荷を下げる事が可能となり、受信端末の処理能力が低下した場合には差分情報を受信しないことによって、処理能力を上げることが可能となる。図3に示す如く、1つの発信端末に対して複数の受信端末を有する場合にも、処理能力が低下した端末のみが差分情報の受信を拒否することによって、他の受信端末への影響を与えなくすることが可能となる。このことにより本発明の目的で

ある、常時リアルタイムな情報転送を行うことが出来るようになる。

【0014】

【実施例】

(実施例1) 図4は本発明の実施例を説明する図である。

【0015】図4は第1の実施例の構成図であり、4-1は送信端末、4-2は受信端末、4-3は4-1と4-2とを接続するネットワーク、4-4は主要情報を転送する仮想チャネル(VC)、4-5は差分情報(高優先)を転送する仮想チャネル(VC)、4-6は差分情報(低優先)を転送する仮想チャネル(VC)、4-7は差分情報の送信を止める機能、4-8は差分情報の受信を拒否する機能、4-9は受信した情報のトラヒック量および受信端末の負荷状態を検出するトラヒック測定部、4-10は差分情報の送信および受信の停止を指示する制御信号、4-11は画像を補完して生成する画像補完生成部である。

【0016】送信端末4-1と受信端末4-2との間には、主要情報を送る仮想チャネル(VC)4-4と一つ、あるいは複数の差分情報を送る仮想チャネル4-5、4-6を設置する。また送信端末には差分情報の送信を止める機能4-7が、受信端末には差分情報の受信を拒否する機能4-8がある。受信端末にはトラヒック測定部4-9があり、このトラヒック測定部4-9から機能4-7と4-8とを制御する制御信号4-10が送信される。さらに受信端末には画像補完生成部4-11がある。

【0017】次に動作を説明する。図5は第1の実施例において送信端末が送信する画像であり、5-1は画像の画素を構成する単位ブロック、5-2は画像の主要情報、5-3は差分情報(高優先)、5-4は差分情報(低優先)、5-5はネットワークに送信するパケット、5-6はパケットに取り付けた仮想チャネル識別子(VCI)である。画素は縦2×横2のブロック5-1に区画し、それぞれ各ブロック内で左上の点を主要情報5-2、右下の点を差分情報(高優先)5-3、その他の点を差分情報(低優先)5-4とする。これらの主要情報、差分情報(高優先)、差分情報(低優先)は同じ情報内容のものをまとめてパケット5-5化し、それぞれの情報で異なった仮想チャネルの識別子(VCI)5-6を取り付ける。これらのパケットは全て同じ優先度としてネットワーク上に送信する。

【0018】受信端末では、図4に示すトラヒック測定部4-9においてネットワークの状態と受信端末の負荷状態を監視する。トラヒック測定部4-9は、ネットワークの負荷が高くネットワークからの主要情報を完全に受信できていないことが確認された場合、制御信号4-10を用いて送信端末が差分情報(低優先)の送信を止めるように指示する。

【0019】図6はこのときの状態を表している。この差分情報（低優先）の送信が止められた状態を状態1、初期状態を状態0と呼ぶ。この状態1において、なおもネットワークの負荷が高くネットワークからの主要情報を完全に受信できていないことが確認された場合には、制御信号4-10を用いて送信端末が差分情報（高優先）の送信を止めるように指示する。

【0020】図7はこの状態を表している。図8に状態の遷移図を示す。状態2において一定時間ネットワークの負荷の減少が確認された場合、状態1に遷移する。また状態1において一定時間ネットワークの負荷の減少が確認された場合、状態0に遷移する。

【0021】トラヒック測定部4-9は、受信端末の処理能力が低下し、受信した主要情報を完全に処理できないことが確認された場合、制御信号4-10を用いて受信端末が差分情報（低優先）の受信を拒否するように指示する。図9はこの状態を表している。この差分情報（低優先）の受信が拒否された状態を状態1'、初期状態を状態0'と呼ぶ。この状態1'において、なおも受信端末の処理能力が低くネットワークからの主要情報を完全に処理できていないことが確認された場合、制御信号4-10を用いて受信端末が差分情報（高優先）の受信を拒否するように指示する。図10はこの状態を表している。

【0022】図11に状態の遷移図を示す。状態2'において一定時間受信端末の処理能力の回復が確認された場合、状態1'に遷移する。また状態1'において一定時間受信端末の処理能力の回復が確認された場合、状態0'に遷移する。

【0023】図4において画像補完生成部4-11は、画像の主要情報、または主要情報および差分情報（高優先）から、差分情報（高優先）と差分情報（低優先）の画像データを生成する。

【0024】差分情報（低優先）が受信されない状態1または状態1'では、画素の各ブロック単位で、画像の主要情報と差分情報（高優先）のデータを複製して差分情報（低優先）のデータを生成する。図12はこの状態を表しており、各ブロック内で右上の点は主要情報からコピーされ、また左下の点は差分情報（高優先）からコピーされる。

【0025】差分情報（低優先）および差分情報（高優先）が受信されない状態2または状態2'では、画素の各ブロック単位で、画像の主要情報のデータを複製して差分情報（低優先）と差分情報（高優先）のデータを生成する。図13はこの状態を表しており、各ブロック内の3点は主要情報からコピーされる。

【0026】以上のような動作を行う結果、ネットワークの負荷が高く主要情報が十分に伝送できない場合には差分情報の送信を止めることにより、ネットワークの負荷を下げ、主要情報の転送が可能となる。また受信端末

の処理能力が低下し主要情報を十分処理することができなくなった場合には、差分情報の受信を止め処理能力を回復させ、主要情報の処理を可能とする。また受信端末では受信される情報の種類によって、自動的に画像を補完生成し、画素は粗くなるものの、画像の継続的な表示を可能とさせる。またこれらの動作は送信端末および受信端末のアプリケーションの動作とは独立して動作するため、アプリケーションの負荷を増大させることはない。

10 【0027】その効果としては、ネットワーク上で画像を転送するシステムにおいて、ネットワークの負荷や受信端末の処理能力の状態に関わらず画像の主要情報のリアルタイムな転送が可能となり、画素は粗くなる場合はあるものの、ストレスの無い継続的な表示ができるようになる。

20 【0028】（実施例2）図14は本発明を3次元の画像データの転送に適用した例を示す。図中の符号14-1は送信端末、14-2は受信端末、14-3はワイヤーステータス情報からなる主要情報、14-4は表面情報からなる差分情報（高優先）、14-5は表面情報からなる差分情報（低優先）、14-6は3次元の元画像を表している。

【0029】3次元の元画像14-6は、リアルタイムに移動および／または回転および／または変形する立体図形のワイヤーステータスに関するデータと、そのワイヤーステータスで挟まれた面に貼り付ける画像または素材といった表面情報とに分け、夫々異なる仮想チャネル識別子（VCI）を用いて転送する。

30 【0030】ワイヤーステータス情報は主要情報14-3として、表面情報は差分情報として転送される。表面情報でも欠落が問題となる情報を含む場合には、それを差分情報（高優先）14-4とし、その他を差分情報（低優先）14-5として、別々の仮想チャネル識別子（VCI）で転送される。

40 【0031】受信端末14-2側における動作は、図4、図6、図7、図8、図9、図10、図11に対応する形で行われる。その結果によって、すべての情報14-3、14-4、14-5が受信されている状態（状態1または1'）と、情報14-5が存在しない状態（状態2または2'）と、情報14-3のみが存在する状態（状態3または3'）とが発生する。

【0032】

50 【発明の効果】以上説明したように、本発明によればネットワークの負荷が上昇し輻輳が生じるか、受信端末の処理能力が低下し全ての情報を処理することができなくなった場合に、差分情報の送信または受信を止めることによって、ネットワークの負荷を下げるか、あるいは受信端末の処理能力を確保し、主要情報の遅延や廃棄の無いリアルタイムな転送が可能となる。その結果、どんな状況においても常にリアルタイムな情報転送を可能とす

る。

【図面の簡単な説明】

【図1】本発明方法が動作する構成図である。

【図2】フロー制御を備えた従来の情報転送方法が動作する構成図である。

【図3】一つの送信端末に対し複数の受信端末を持つ場合の構成図である。

【図4】第1の実施例の構成図である。

【図5】第1の実施例において送信端末が送信する画像である。

【図6】第1の実施例においてネットワークの負荷が高くなった場合の状態1の動作図である。

【図7】第1の実施例においてネットワークの負荷が高くなった場合の状態2の動作図である。

【図8】第1の実施例においてネットワークの負荷によって遷移する状態の遷移図である。

【図9】第1の実施例において受信端末の処理能力が低下した場合の状態1の動作図である。

【図10】第1の実施例において受信端末の処理能力が低下した場合の状態2の動作図である。

【図11】第1の実施例において受信端末の処理能力が*

*低下によって遷移する状態の遷移図である。

【図12】第1の実施例において、状態1で画像補完生成部が生成する画素データである。

【図13】第1の実施例において、状態2で画像補完生成部が生成する画素データである。

【図14】第2の実施例を示す図である。

【符号の説明】

1-1 送信端末

1-2 受信端末

10 1-3 ネットワーク

1-4 仮想チャネル

1-5 仮想チャネル

1-6 トラヒック測定部

1-7 制御信号

14-1 送信端末

14-2 受信端末

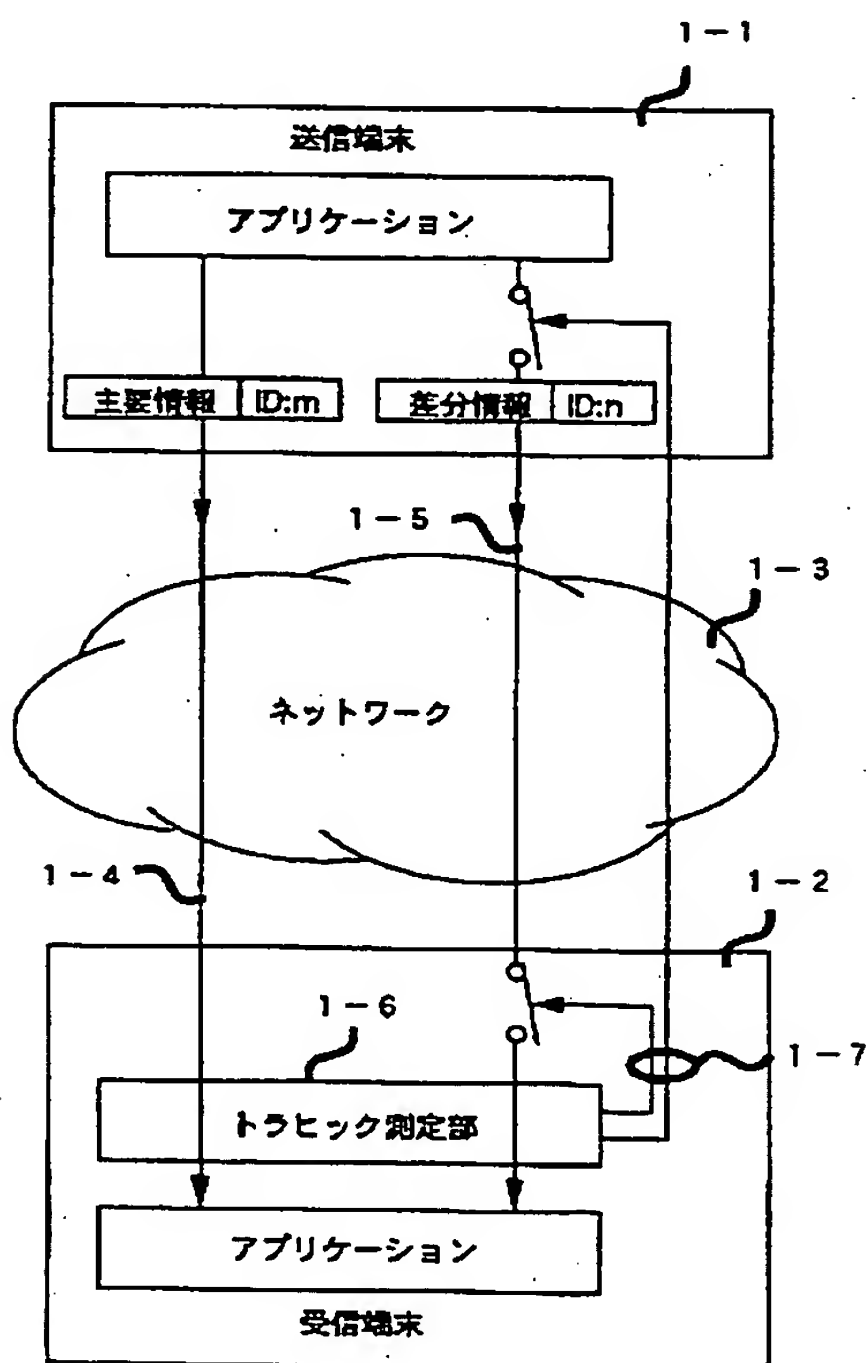
14-3 主要情報

14-4 差分情報（高優先）

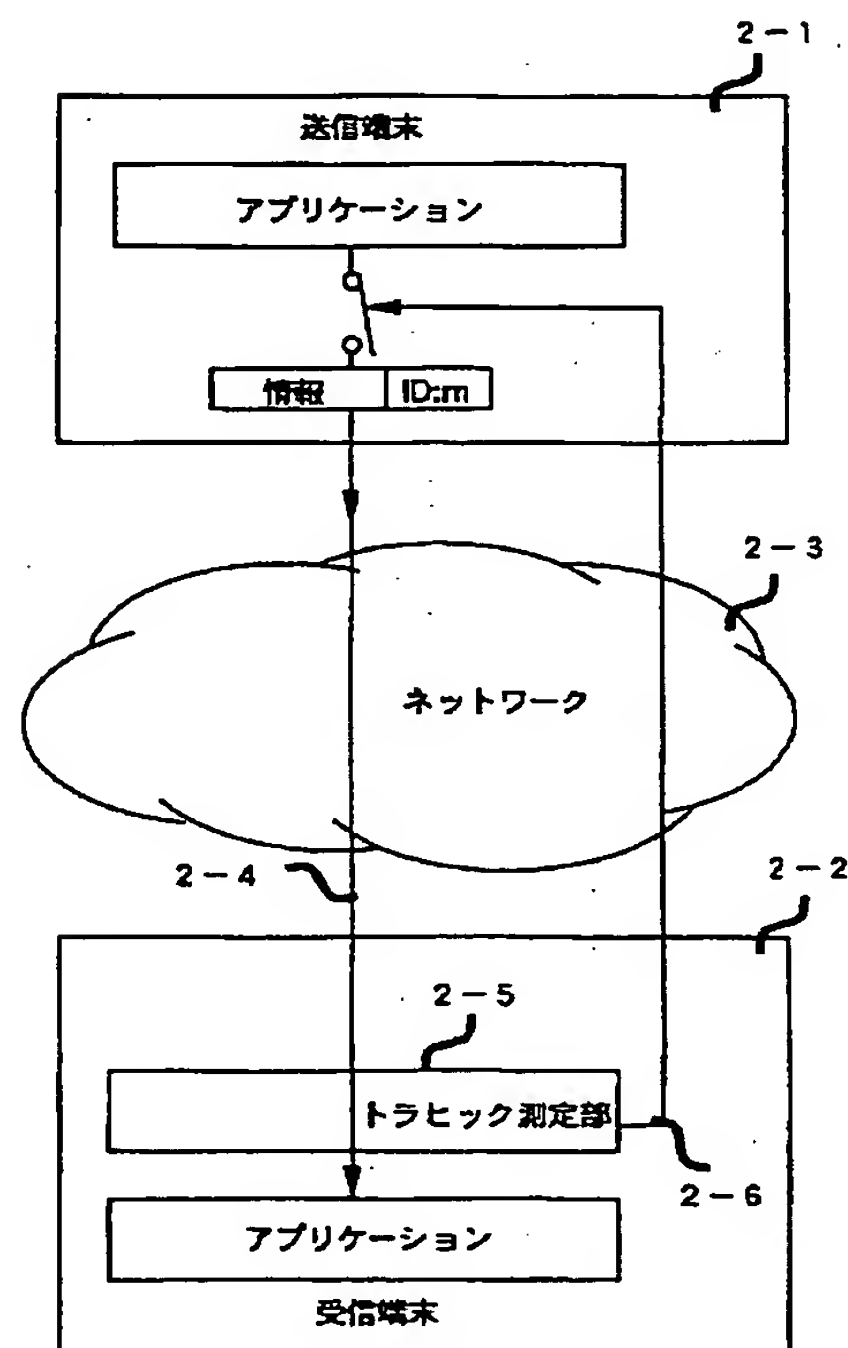
14-5 差分情報（低優先）

20 14-6 元画像

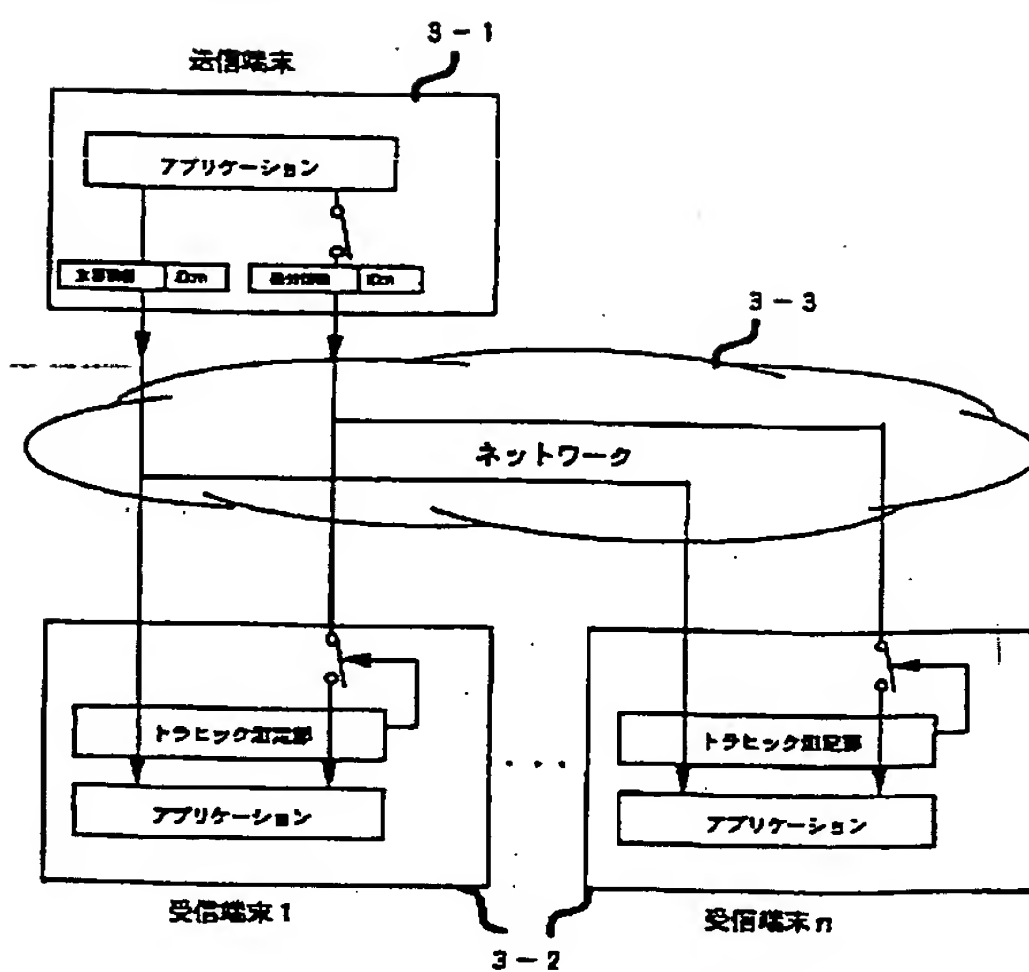
【図1】



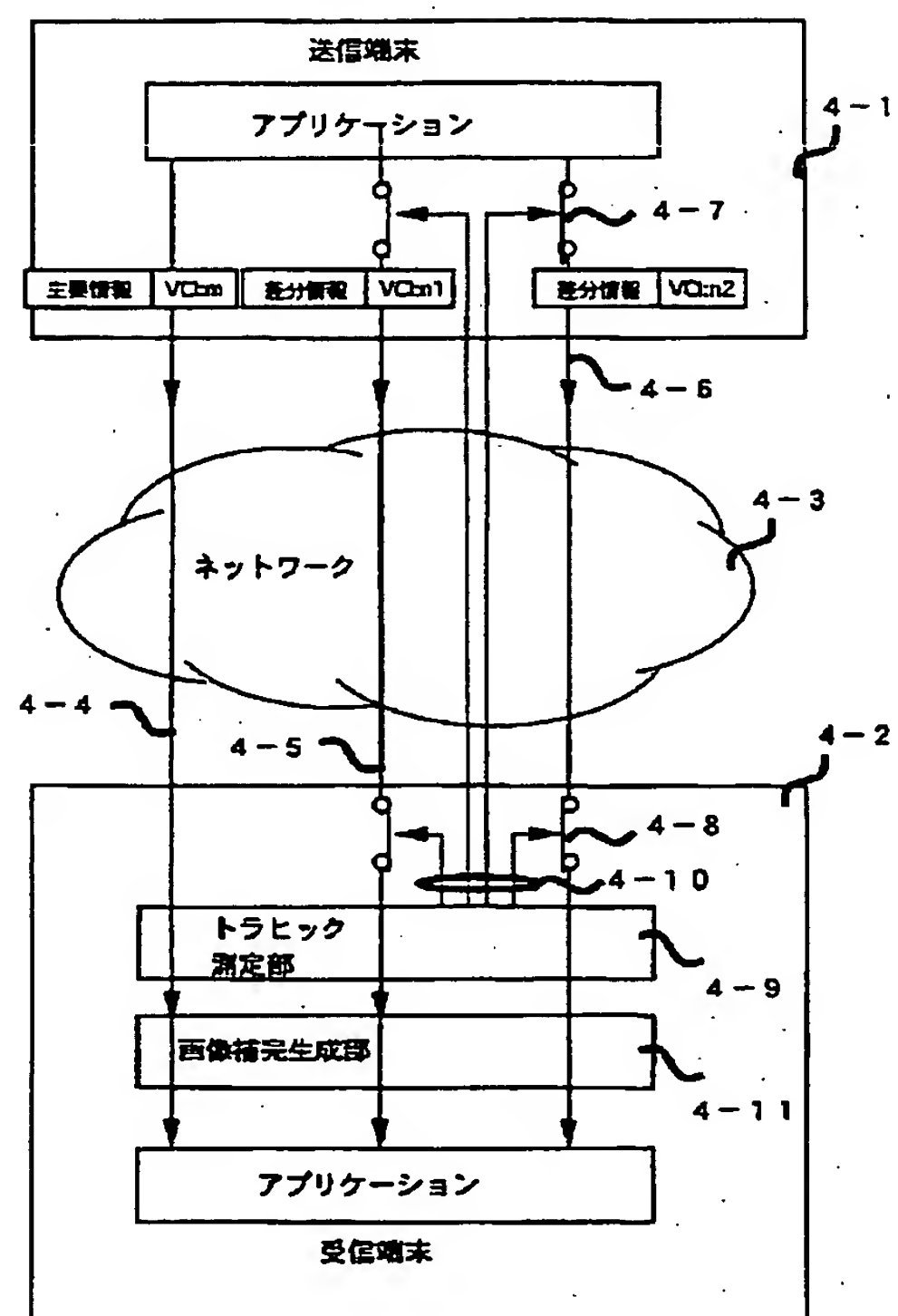
【図2】



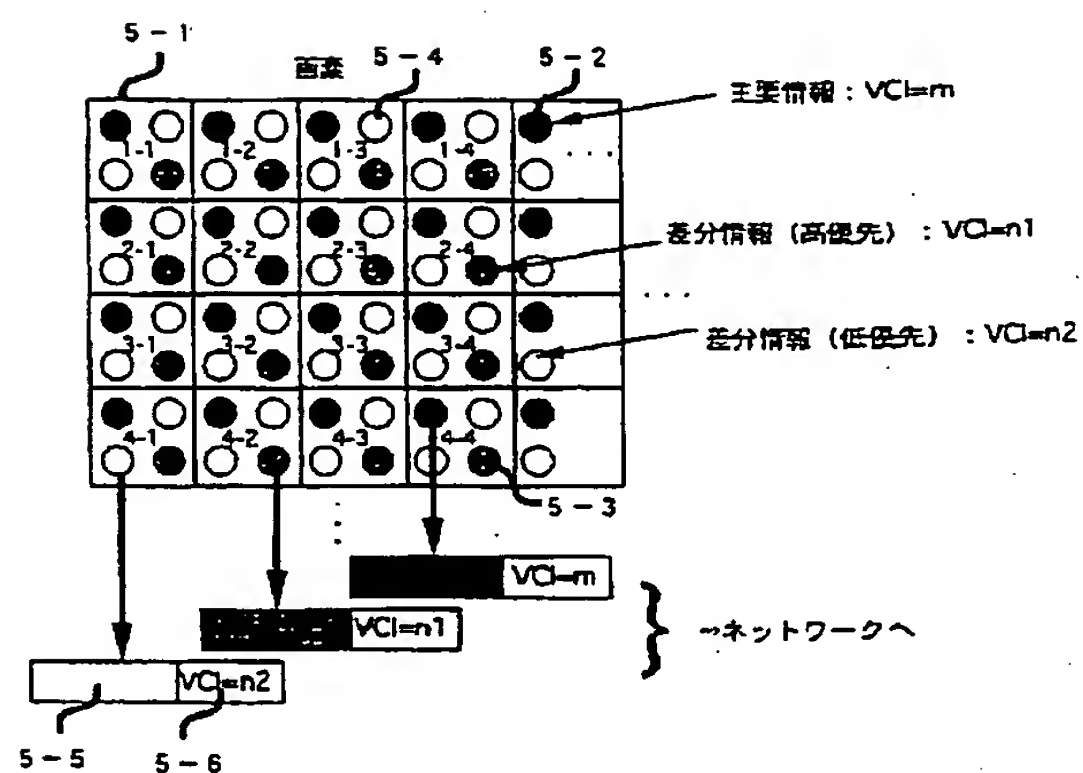
【図3】



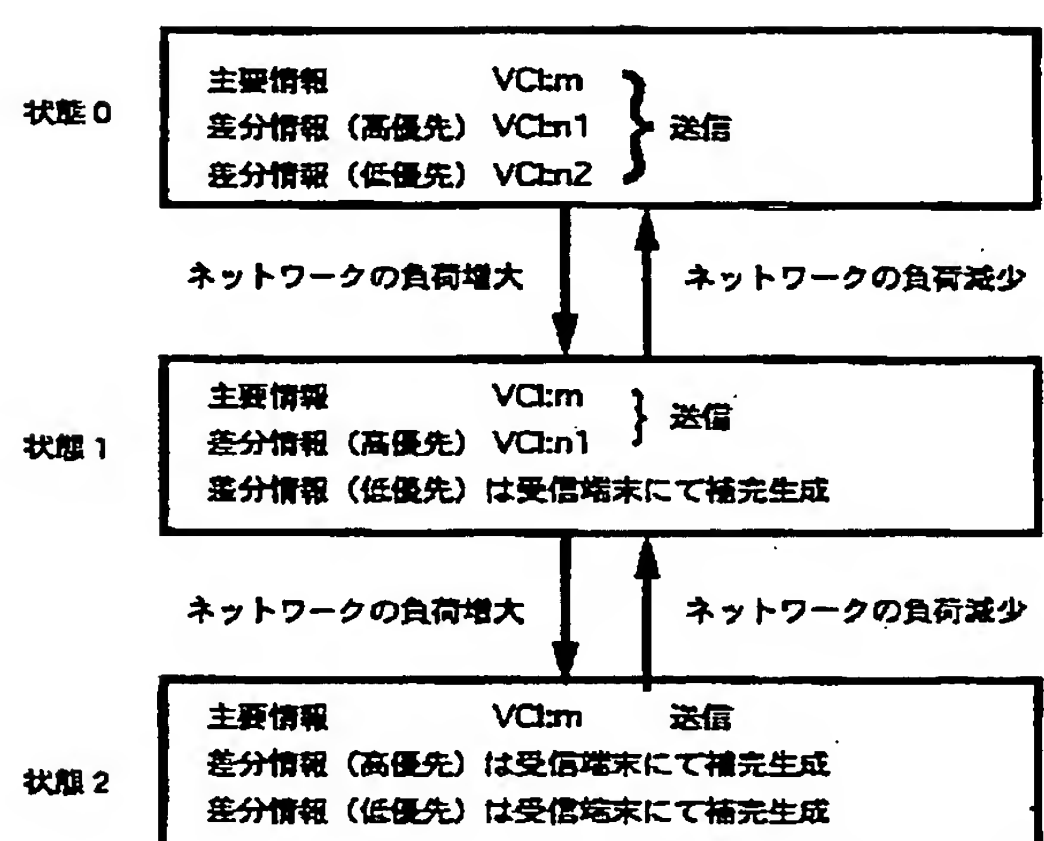
【図4】



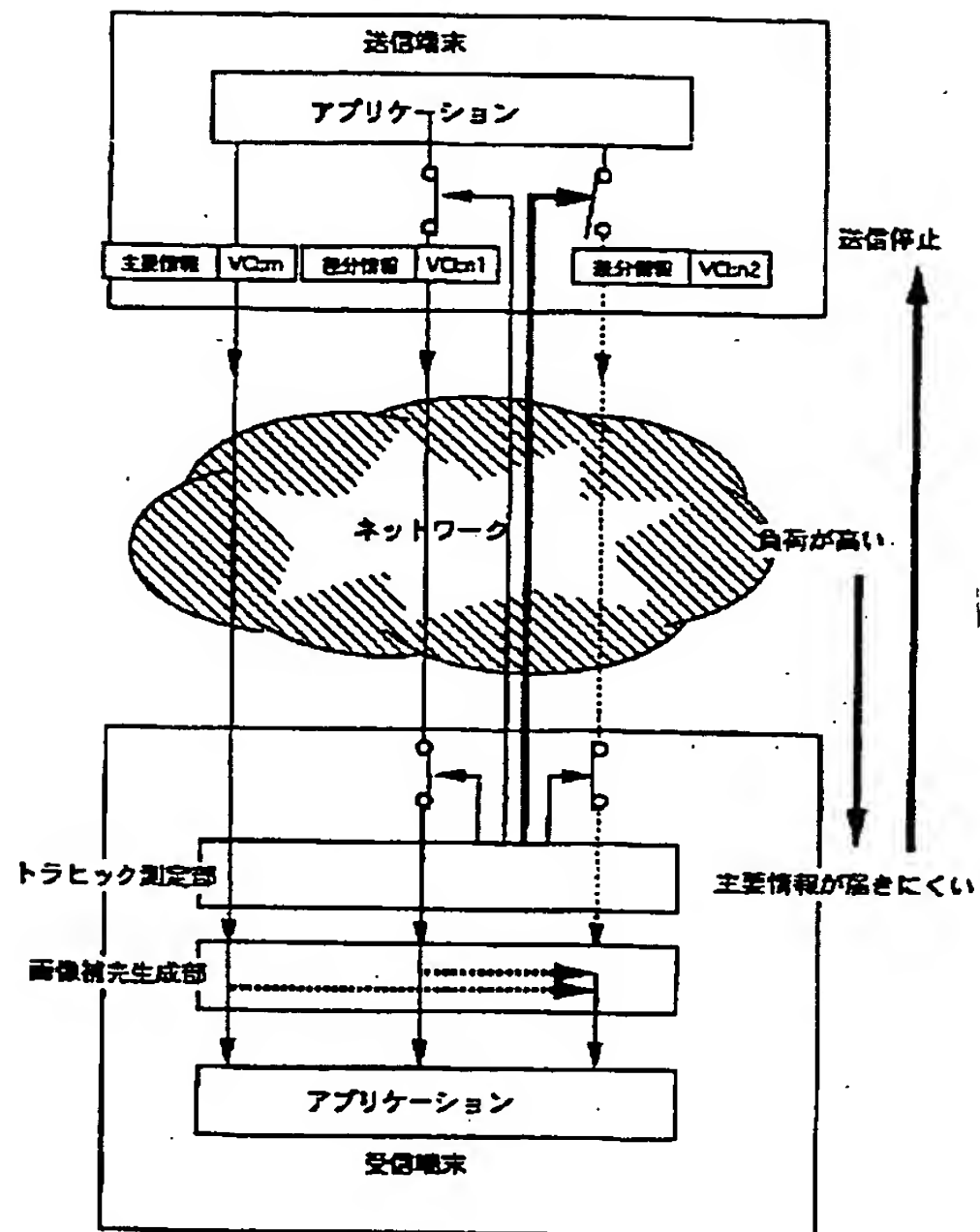
【図5】



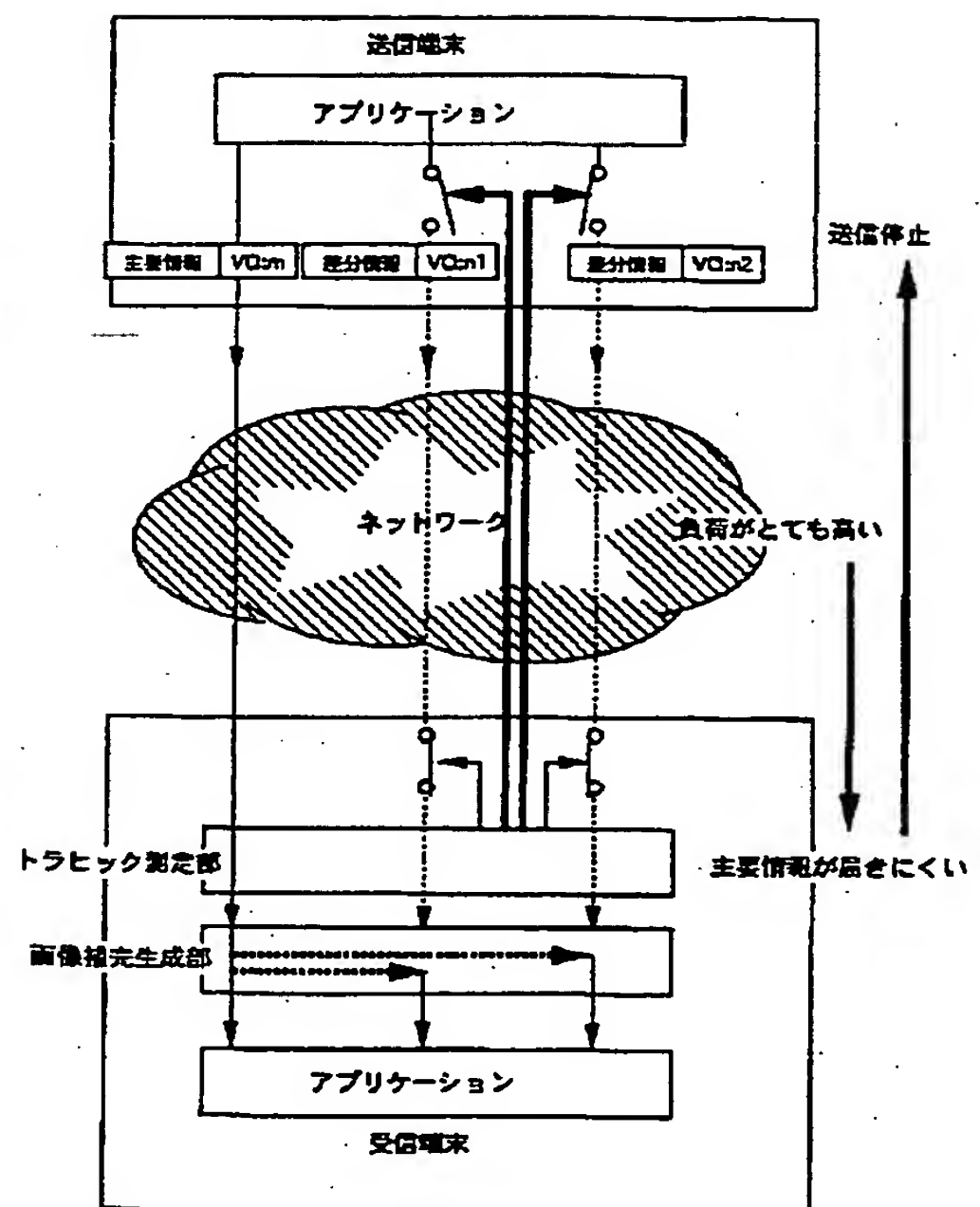
【図8】



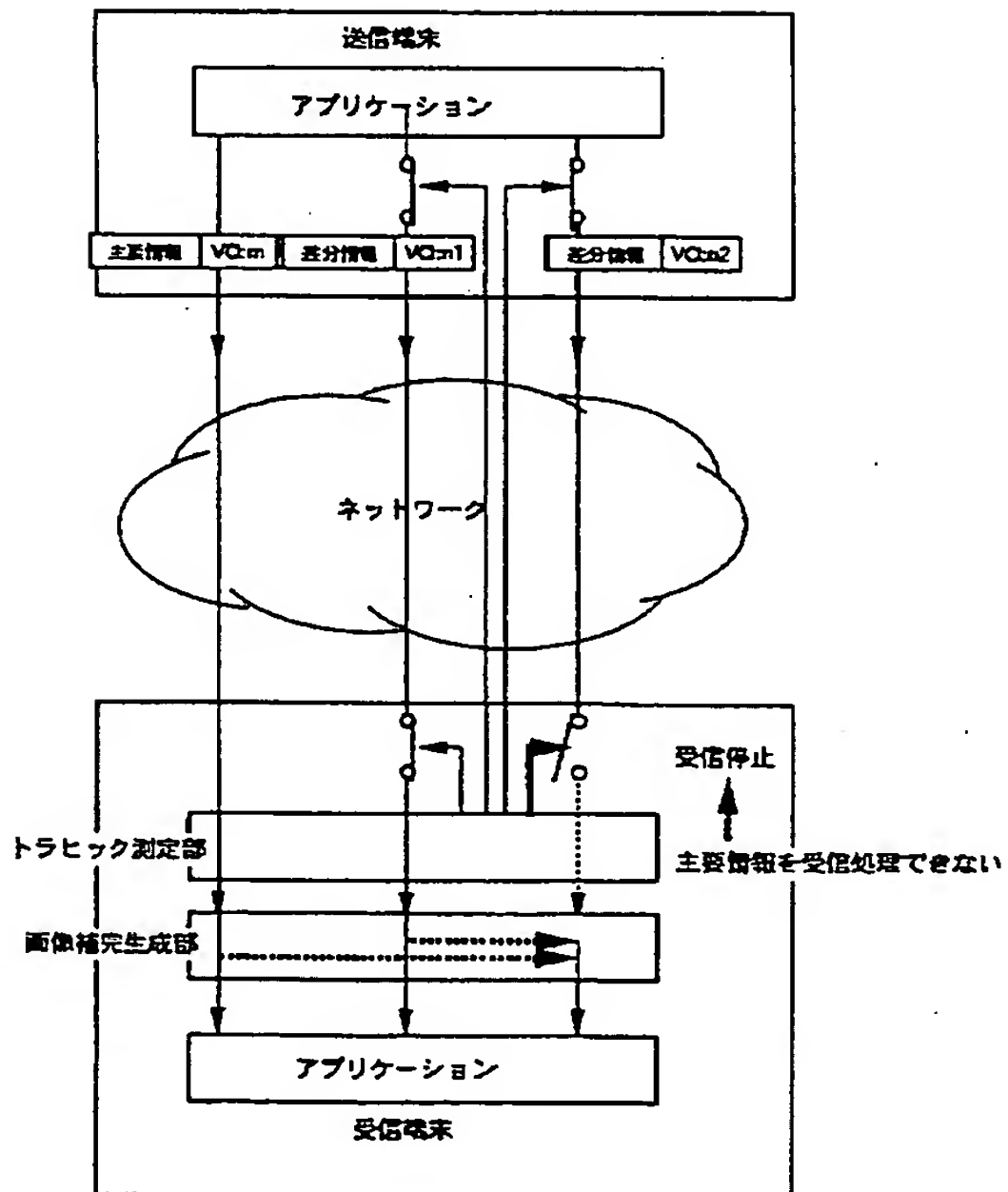
【図6】



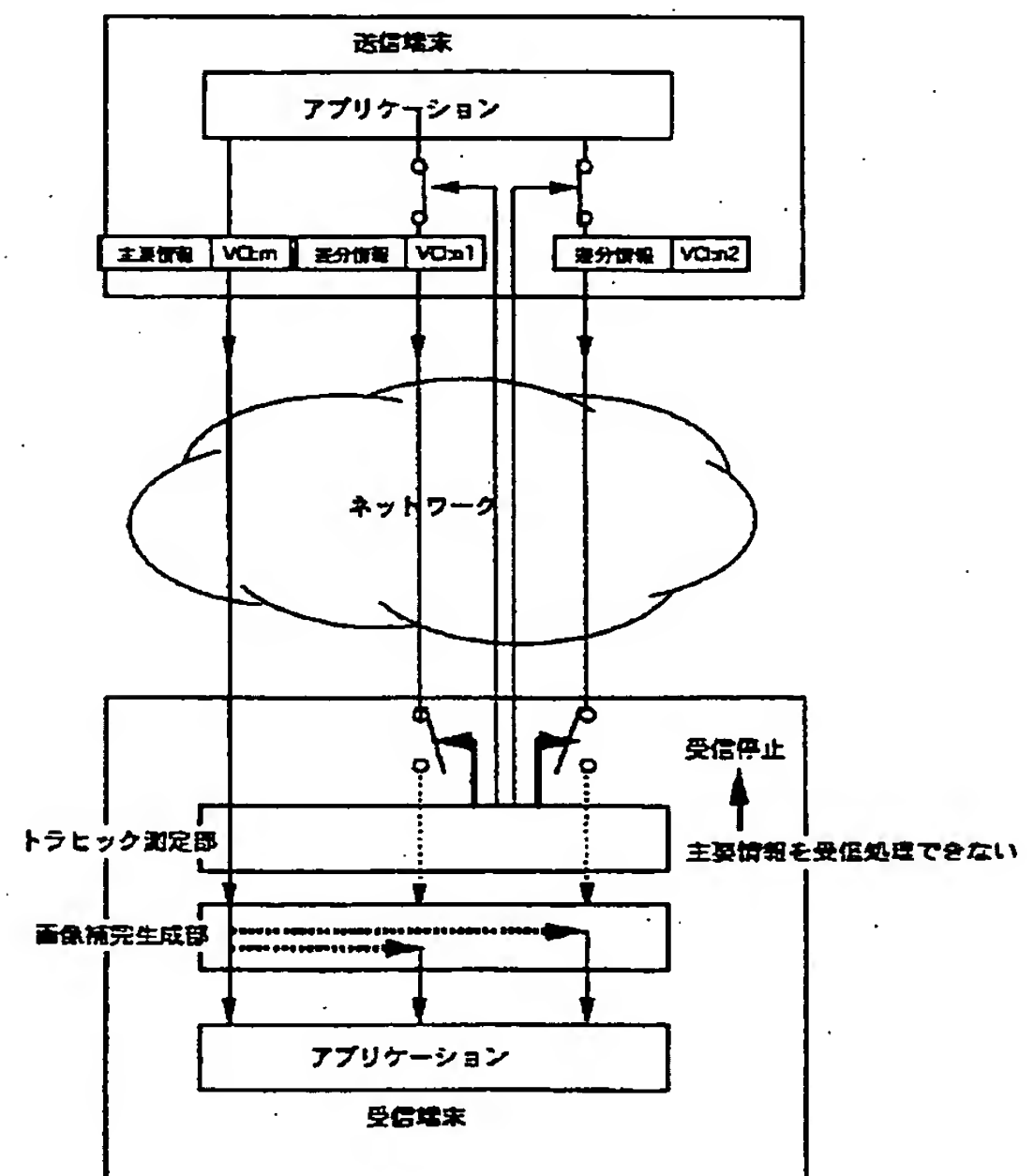
【図7】



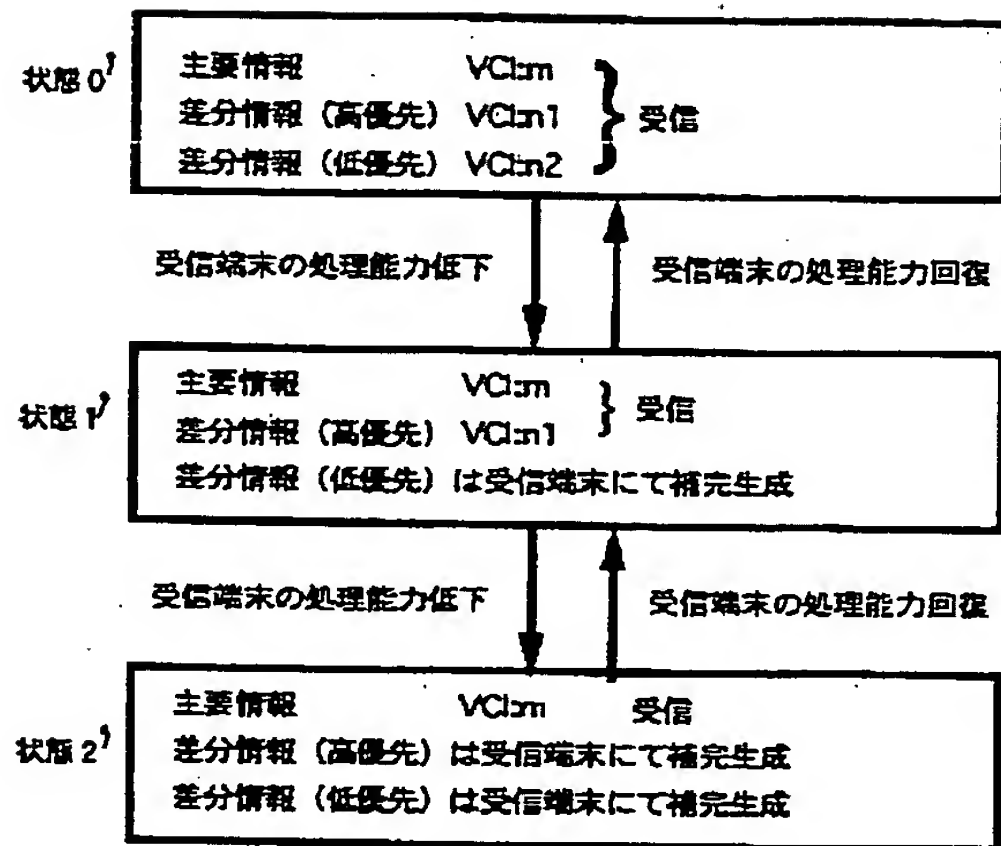
【図9】



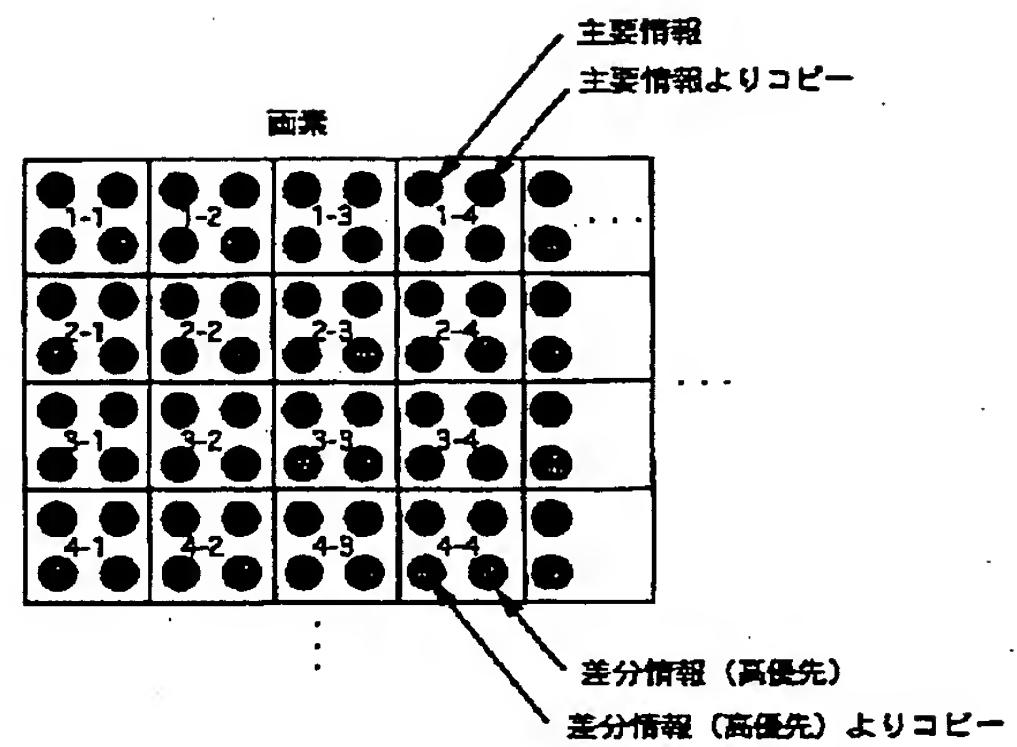
【図10】



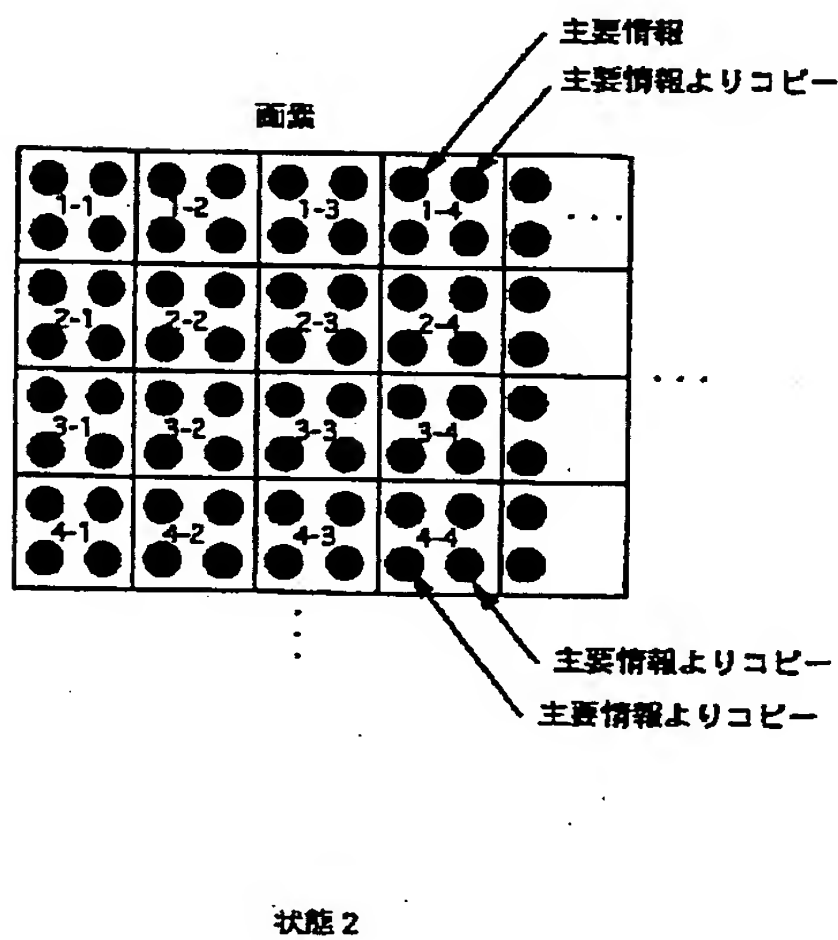
【図 11】



【図 12】



【図 13】



【図 14】

